

48  
9

A  
Great Improvement  
I N  
Watch-Work;

Which may be of great Use at S E A, for Discover-  
ing the

LONGITUDE.

Humbly offer'd to the CONSIDERATION of  
the LEARNED.

WITH SOME

REMARKS

On another Way of discovering the

LONGITUDE.

To which is Added,

An Advertisement

Relating to divers other

Useful Inventions.

By WILLIAM PALMER, a LOVER of  
Mechanical Motion.

YORK: Printed by GRACE WHITE and  
CHARLES BOURNE, (Executors to JOHN  
WHITE, deceas'd) and are to be Sold by  
the Author, MDCC XVI.

## Advertisement.



REMEMBER I have somewhere met with an Account of a Needle that was hung on an *Horizontal-Axis*, and turn'd on two fine *Pevits*, its Center of Gravity lay in its *Axis*, which made an *Equalibro* in all Positions: This being toucht with a *Load-Stone*, will take a position according to the *Latitude* of the place. Now if this has its variation in different Places of *LONGITUDE*, I see no reason why it may not be of use in discovering the *LONGITUDE*, as well as the variation of the *Horizontal-Compass*.

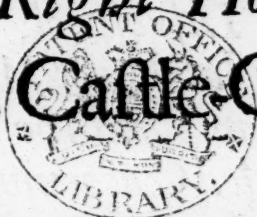
The Author and his Partner *Robert Warter of Craike*, near *TORK*, undertakes the raising of Water, draining of Grounds, Building of Mills, and other self-moving *ENGINES*, for divers Purposes. Together with variety of *Clock-Work*, both Common, Musical, and such as represent Celestial Motions, and living Creatures, in great variety: The Author is willing to draw Drafts, and give Directions to other Work-Men in reasonable Terms, for Gentlemen, or others that require it.

The Author intends no further recommendation of himself, then the general Charracter, that may be found within Twenty Miles round *Craike*, where he hath been known near Twenty Years.

To



*To the Right Honourable  
Visc. Castle-Comer.*



May it please your Lordship,



*HAT I take this Opportunity to return to your LORDSHIP my Humble Thanks for the great Favour of your Communicat-  
ing my Thoughts to the Learned, and  
procuring their Answer: 'Twas your  
Lordship's Direction that I should  
give my further Opinion concerning  
what I proposed in relation to a Dis-  
covery of the LONGITUDE, by the  
MOON's approaching to, or from  
fixed STARS, which lie not far out  
of Her way. I was disappointed of  
returning an Answer by being un-  
fortunately engaged in some Business,*

A 2

*from*

*from which, I am but lately set free. So I desire that your Lordship will not Interpret this Delay to proceed from either Disrespect, or Ingratitude. I have lately got Mr. Whiston's Book, wherein I find the Substance of what I intended Concerning the MOON's Motion, is in better Hands, than mine. So I shall here say no more relating to it, except that I do not perceive they take any Notice of the MOON's Approaching to, or from Retrograde-Planets, whose Motions lie the contrary way to that of the MOON. So that their Distance may be taken by a Cross-Staff, or such like Instrument, to a Nicer Time, than can be had from either SUN, or fixed STARS, whose Motions lie the same way with that of the MOON.*

*As to the Difficulty of obtaining the True Places of the MOON, and Planets; That I must leave to the Judgment of the Learned, and also whether*



*ther Tables may not be Calculated to shew the Times of several Distances between the MOON, and other STARS, and PLANETS, to make this way of finding the LONGITUDE, to be easily Understood, and Practised by Common Navigators.*

*If this can be done, I humbly Conceive that tho' this be not so Exact, as perhaps, may be Required, yet it it may be a good Help to correct a long Reckoning, when other Helps, are either Imperfect, or wholly wanting.*

*As to That of a Movement, if a true Motion could be obtained, I find as well by Mr. Whiston's, as Mr. Ward's, and Mr. Thaqueray's Books (All which I have met with since I sent my first by your Lordship) that there is nothing yet thought of, that would more easily, and universally Discover the LONGITUDE at Sea : This gives me some Hopes of being*

*ing serviceable that way, by reason of some Notions I have had about the Defects, which are at present in Watch-Work; and also of an Artifice that will remove the main Part of those Defects at once, which, by Degrees, I brought to Effect in Notion, before there began to be so much Talk about finding the LONGITUDE, but never yet put it in Practice, having been forc'd through want of Opportunity, to let both this, and several other Useful Inventions, lie Dead; but seeing your Lordship has been so Generous, as to Assure me of all manner of Encouragement (which shews the Zeal you have for the Honour, and good of your Country) I am resolved, by God's Assistance, to make some further Progress in this Matter, who am,*

My LORD,

Your LORDSHIP's most Obliged,  
and most Obedient Servant,

WILLIAM PALMER.

# Great Improvement Watch-Work.



BEFORE I laid the Foundation of this Improvement, I Considered, That there were these Defects in the best of *Watch-Work*.

*First*, That those, with Springs [and such are all, which are usually made for the Sea] must needs vary by Heat and Cold: For the warmer that a Spring is, the longer and weaker it is; and the colder that a Spring is, it is the shorter, and stronger.

*Secondly*, If the String be a *Tharm*, its length is varied by Wet and Dry; and if it be a Chain, it is continual-

ly wearing longer; so that it seems not possible for the Spring to draw equal at the Wheel.

*Thirdly*, The Adjusting of the Fusie to the Spring is so difficult, that it rarely is so well done, as to lay an Equal Power upon the Wheels, from the Top, to the Bottom.

*Fourthly*, There is a great Hazard of the Spring Setting, by being frequently Bent, and let down again; so that it becomes weaker, and so alters the adjusting of the Fusie.

*Fifthly*, It is a great difficulty to form the Teeth, and Pinions in such a Natural Shape, as to cause the Wheels to move one another, with an equal Power; so that if the Main Wheel [for Instance] drive the Second Wheel-Pinion in such disorder, as not to have an equal Force on it, in all Positions: This being but slow in Motion, causes several Turns of the Ballance-Wheel to move strongly,



strongly, and then, again, as many turns to move weakly. The like Disorder happens in all the rest of the Wheels. This is the Apparent if you take the Regulator out of a *Watch*, you shall see, and hear much Inequality in its Motion. I have bestowed some Pains to find out the Natural Shape of *Tooth*, and *Pinnion*, and I think I have effected it to Demonstration, but never had yet Opportunity to put it in Practice, but am *Constrain'd* to let it lie Dead, with other Things, 'till Providence enable me to carry on such Experiments.

Another great Hinderance is the Oile, which moistens the Pevets, &c. which are not only altered by Heat, and Cold, but also grows thick, and clammy in its own Nature: Likewise it is apt to contract Dust, beside what is worn of the Mettle it self; Most of these Accidents never miss happening the Oile in a Movement,  
which

which added to what goes before, must needs bring a monstrous Inequality of Power, to keep a Ballance in Motion, and consequently must produce an unequal Motion, notwithstanding all the Care and Curiosity that can be used in the Working-Part. So that [with Mr. *Whiston*] I hardly expect that any Movement which has yet been made, will be sufficient for a Discovery of the *LONGITUDE*. But hope that I have an *Artifice* that will prevent the greatest Part, if not all the Objections, that can be made against a Movement, which is to apply a Power to a Ballance, to keep it in Motion, wherein *Teeth* and *Pinnions*, *Fusie*, &c are nothing concern'd, but the power that keeps it in Motion, is quite of another Nature; and as far as I can conceive, will be infallibly constant and equal, and no ways liable to the Inconveniencies before-mentioned.

As

As to the Cautions, I received in a written Paper from the Learned Concerning a Movement being affected by Wet and Dry, I think Mr. *Ward*, and Mr. *Thaqueray*, have sufficiently provided, by putting the Movement into a Receiver, where the Air is Sucked out. This must make a Balance play more freely, and also secure the Movement from the Influence of Salt-Water : And as for Heat, and Cold, I think it may be brought to an Equality, by placing the Movement near a Fire, which may keep it of an equal Heat, by careful Attendance, and Observation of an Instrument, which shews the Degrees of Heat, and Cold, to be placed near the Movement. This Fire may be a Stove, or it may be a Lamp, and so it may serve for a light in the Ship.

As to the Use of an equal Time-keeper at Sea, I suppose it needless to say much, because I imagine it  
will

will be done better by others, than can be expected from me, who have neither been at *SEA*, nor bred a Schollar. So I shall only take Notice of two helps, which may be of Use, in case a Movement should prove some what Imperfect.

The first, is to have Two, or Three Movements in one Ship, going at Once, to prove one another, as is done with Compasses: Or if there be a Company of Ships together, they may sometimes compare all their Movements together, so that if any fail, that may be Discovered by the Rest.

The Second is, what Mr. *Whiston* seems to take Notice of, and that is to Rectify the Movements at every known Place of *LONGITUDE*, which may be done, as well as the *LONGITUDE* can be Rectified by a true going Movement.

So



So if the Honourable Commissioners, appointed by Act of Parliament for the Discovery of the *LONGITUDE*, think there be any thing in these Notions worth their further Enquiry, if they please to send a Letter to me at *Craike*, to be left with Mrs. *Hall*, at the three *Cranes* in *Thursday-Market*, in *York*, I shall do my Endeavour to serve them, and my Country, to the utmost of my Power.

*Advertisement.*

**T**HE Author has newly brought to Effect a *POCKET-WATCH*, which hath neither Contrat, nor *Crown-Wheel*; so that there is no inverted *Axis*, but all the Wheels are upright, and lie the same way in the Frame, by which they Work more *Naturally*, both on the *Ballance-Wheel-Pinnion*, and also on the Pallits of the *Ballance*. The *Ballance* Turns, or Crosses

ses as far, as those which have been commonly made. So that there is no Inconvenience in this Improvement.

He has also brought to Effect, a *Water - Pendulum*, which may be made at a very light Charge, and may be placed in a very small Stream of WATER; as much as will run through a *Goose-Quill*, is sufficient to keep it in Motion: It seems to produce a far more constant Motion, than can be expected from the unequal power of Wheels, &c.

By the same *Artifice*, the Author has lately made a *Water - Engine*, which works by *Water*, without a *Water - Wheel*, and raises about as many *Hogsheads* of *Water* in a Day, as there are Days in a Year, about Threescore Yards *Perpendicular* Height, to the Top of an Hill, where the *Water* flies out of the end of a *Lead-Pipe*, with such Violence, that it is seen to Tower above the Tops of

94  
Hydraulic  
Rams?  
X

+ Whitehurst invented his in 1772  
Montgolfier invented his in 1796

of the Trees, at above Two Miles Distance: This *Engine* is made of *straight* Wood, which will be no small Advantage now, when *Crooked* Timber becomes scarce. It is made with much fewer Instruments, than any other that I have heard of. For the Trouble of reducing *Circular* Motion to Direct, by Cranks, &c. is wholly avoided: It has this Advantage above others, that it will work with less Water, than will turn a *Water-Wheel*. So that if any Gentlemen have but an indifferent Spring of WATER about his House, or Ground, which hath any considerable Fall, one part of it may raise another, to furnish the House with Water, &c. For it is of such a Nature, that it will work as forcibly (tho' slower) when there is but little Water, as when there is much.

It may be applied to the Working of most sorts of *Pumps*, or to Sawing Wood,

Wood, or Stones, or Fulling-Cloth, or drawing Wire, or Pounding in Mortars with Pestils, or Turning large Screws, either in *Iron*, or *Wood*, or Rocking Cradle, or Washing-Cloaths, or Churning Cream in a Standing-Churn, or any other Work that requires Motion either up and down, or too and fro, &c.

He has also Contrived a *Wheel*, which being turned about either by Water, Wind, Horse, Hand, or any other Power, raises Water to a small height in vast Quantities; so that it seems to be the *plaineft*, and most perfect *Engine*, that has yet been found, for Draining *Wet - Ground*. For it needs no Race for the *Wheel* to run in, but takes up the *Water* out of any plain Pond, &c. And may be easily removed from Place to Place.

He hath several other Inventions, which would be of Universal Use for the good of Mankind, which the World may expect, if it please God to give him Opportunity and Ability.

F I N I S.





th,  
in  
ing  
od,  
ng-  
n a  
ork  
nd

eel,  
by  
ny  
all  
it  
er-  
d,  
it  
un  
ny  
ly

as,  
or  
ne  
o